NEVARC NEWS VK3ANE

Incorporated in Victoria, 2014, Registration Number: A0061589C
The monthly magazine of the
North East Victoria Amateur Radio Club http://nevarc.org.au/

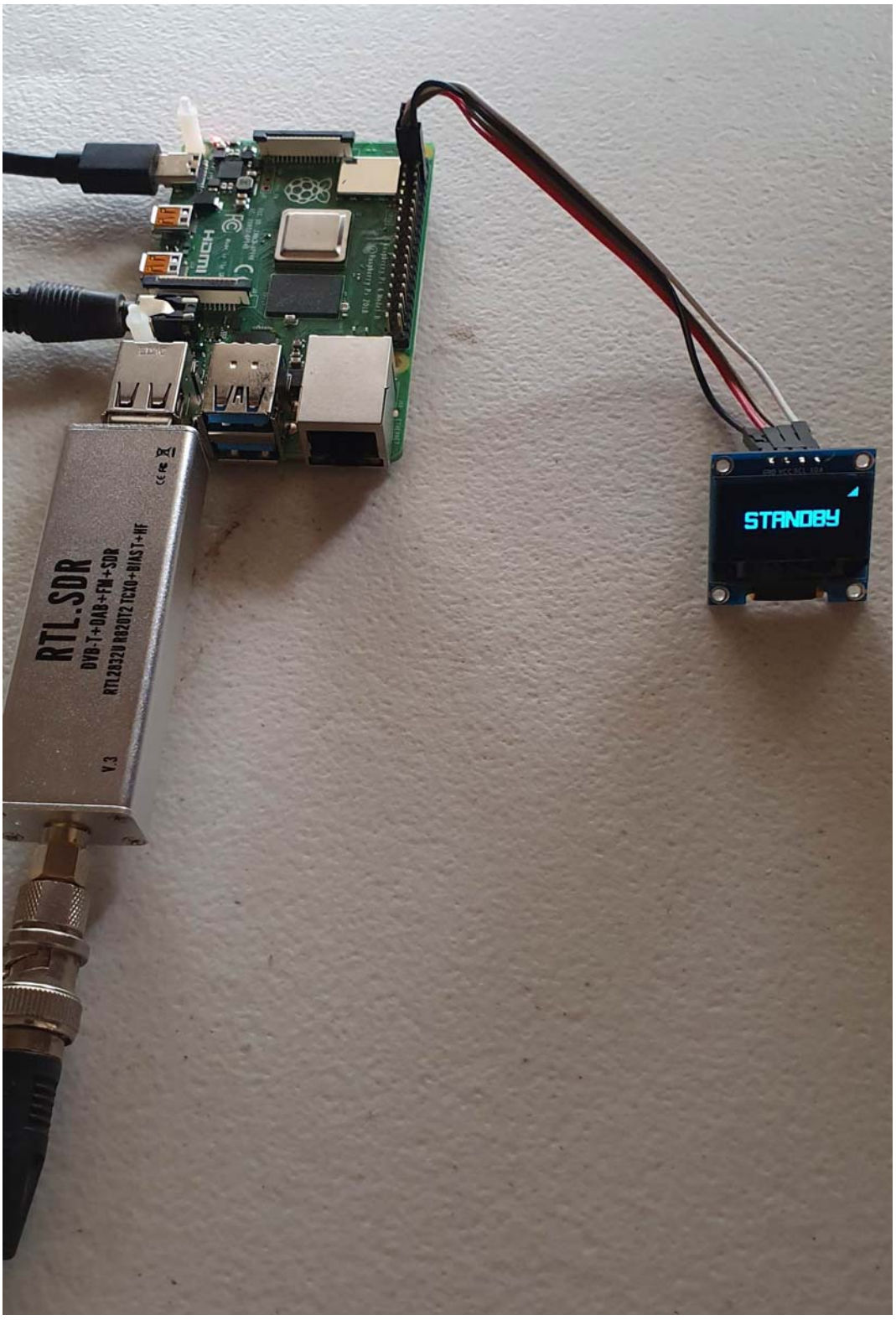
affiliated club of the Wireless Institute of Australia

Volume No: 07 Issue 3 March 2020

Next Club Meeting
Sunday 8th March
Belviour Guides Hall
6 Silva Drive West Wodonga

Meetings commence with a BBQ (with a donation tin for meat) at 12pm with meeting afterwards
Members are encouraged to turn up a little earlier for clubroom maintenance
Call in Via VK3RWO, 146.975, 123 Hz tone

Last Months Meeting



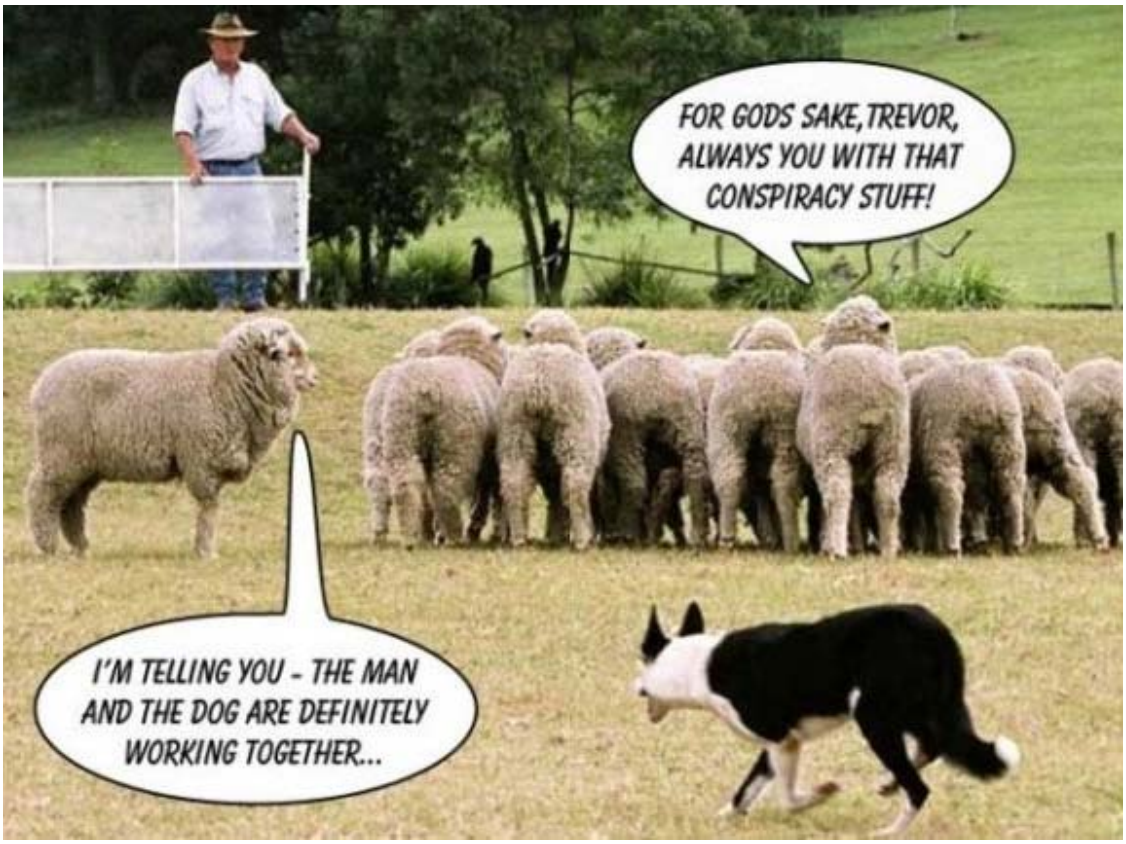
At last months meeting, Matt demonstrated a very cheap way to listen to the Regional Mobile Radio Network. A cheap RTL.SDR Dongle that can receive DAB+ Radio, FM Radio & General Coverage Software Defined Radio, all inside the silver module that is plugged into a Raspberry Pi.

RTL 2832U dongle can tune from 500 kHz to 1.7 GHz and has up to 3.2 MHz of instantaneous bandwidth, 2.4 MHz stable.
HF reception below 24 MHz in direct sampling mode with reduced performance.

The RTL-SDR dongles are RX only.

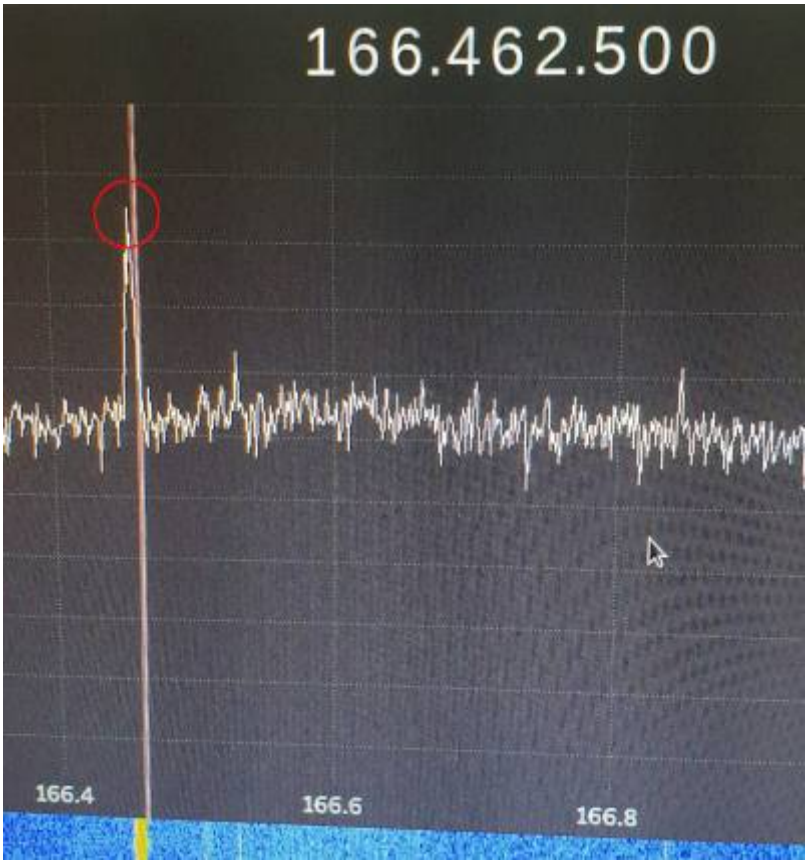
These are about $40 on EBay.
Matt is using OP25 to decode the P25 voice traffic data which allows the CFA and SES to communicate within Victoria.
There is a bit of Python scripting and bash scripting to drive the display.

Phil VK3ELV gives a talk on his home brew cavity resonators for the new VK3RWC repeater in Wangaratta. David VK3DTS, Frank VK3BFC and Tegan VK3AAF watch on, as he gives the details of his project.

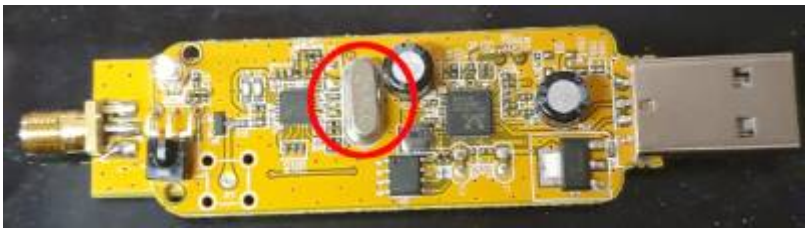


Chinese RTL.SDR Fix

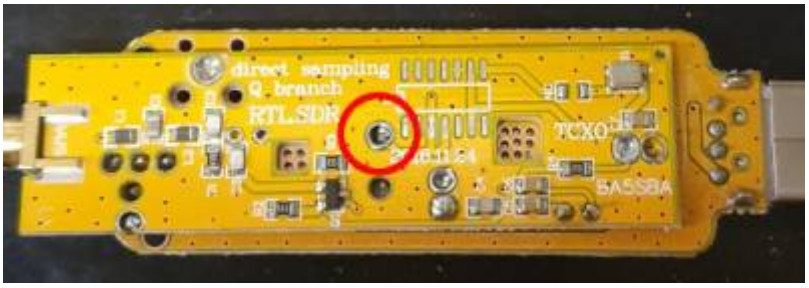
Some time ago I bought some cheap RTL-SDR dongles from eBay. They were supposedly 1ppm with a TXCO built in. They turned up and I plugged them in, and using Gqrx tuned them to a local P25 beacon that I know. surprise, surprise, the SDR dongle was a mile (12 odd kHz) off frequency.



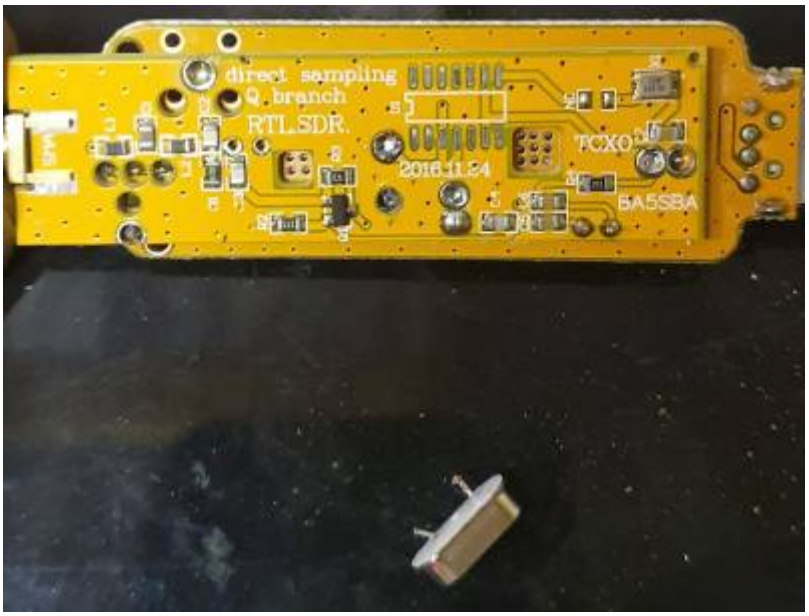
Upon pulling the thing apart, I found that there was a standard rock installed. Also this board is sold as a cheaper unit, and still has the IR receiver installed… direct ripoff.



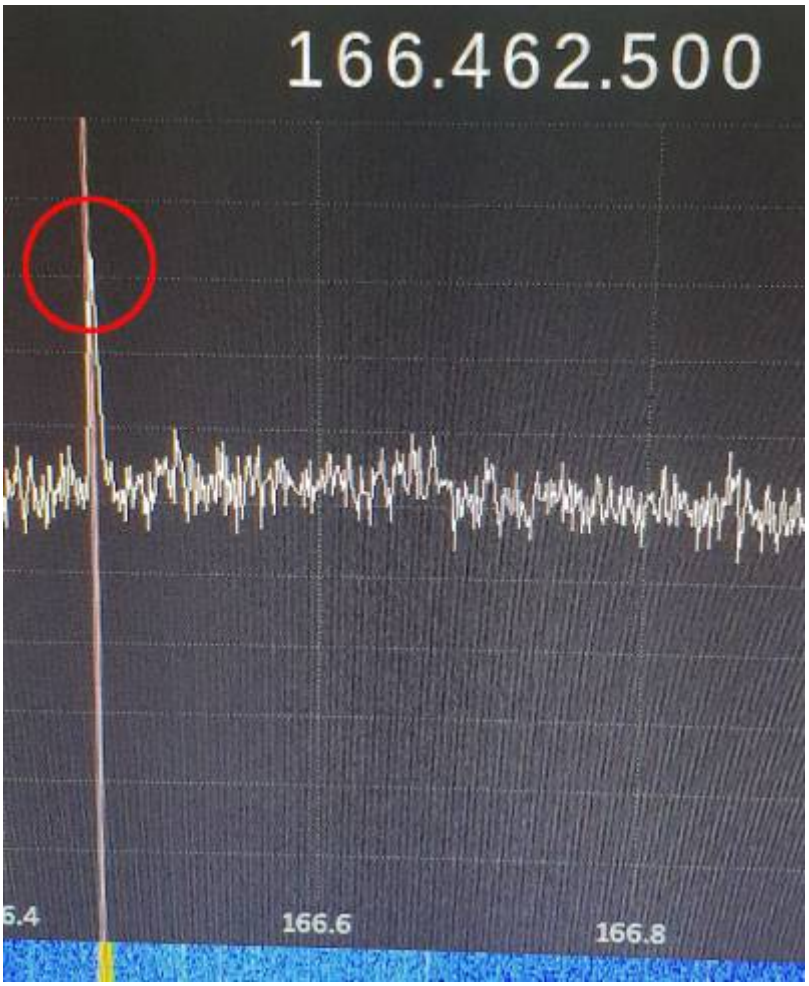
I turned the board over, as there was another board sandwiched on the back. On this board is an SMA connector, a few inductors, a small transistor amp and WOW, a 28.8Mhz TXCO sitting there not hooked up.. Circled on the following photo, is the pad it connects to, however this has not been soldered as the standard crystal is still installed. Checking, the TXCO is powered by 5V, Oscillates quite happily and doesn't go anywhere.



Well, me being me, I couldn't help but smash the standard crystal off the board and throw a bit of solder down the hole:

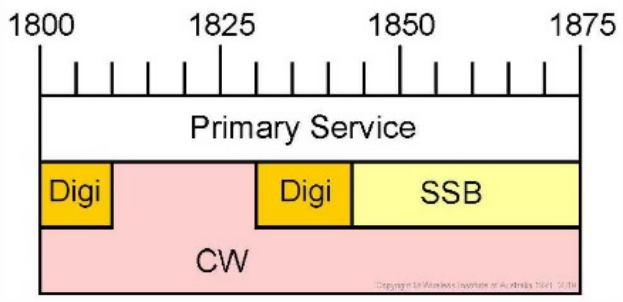


And well, for 5 mins of work, and a $30 Chinese dongle, I now have an SDR Dongle that is on frequency, and stays there!



~Matt VK3SMB

Another 160 Meter BandTop Loaded Vertical Antenna~ Mick VK3CH



I have previously built two of these that worked well, in 2012. Back then the Melbourne AM Net was on 1843 kHz.
Unfortunately with moving house they were lost or damaged over time. The coil section seems to be the most fragile part.
Both were based on the classic Drew Diamond VK3XU Design.
Many 160 meter hams in Melbourne have built these. Melbourne "Coffee Club Net" on 160 Meters going since the early 1970's.

I have worked the 11.00am "Coffee Club Net" on 160 Meters on 1825 kHz AM with mixed results on my horizontal wire dipole.
The proper way to work local 160 meters is of course using vertical antennas.

But with the dipole, before it was changed into a loop, I got these typical results;

Location	**Signal**	**Voice Quality – Ease of Listening**
Blackburn South	S 9 +40	Loud, Perfect Copy
Blackburn	S 9 +40	Loud, Perfect Copy
Croydon	S 8	Heard below the noise
Dandenong	S 1	Just heard below the noise
Badgers Creek	S 1	Just heard below the noise
Wonga Park	S 9 + 10	Perfect Copy
Croydon	S 0	Just heard below the noise
Knoxfield	S 9 +10	Perfect Copy
Wantirna South	S 8	Heard below the noise

It should be noted that some stations that I heard could not hear me at all.A lot of the ones I hear well are running 100 watts carrier.
I am running 25 watts carrier.
Background noise floor is typically S 6 to S 8 and it varies widely daily, sometimes interference from the commercial AM stations.

It was time to get serious with AM again by getting another Top Loaded Vertical Antenna.
The hardest thing will be to find a permanent space to install it at home, just not enough clear room to run 40 meters of ground radial wires from the antenna base.

The first thing was to find suitable copper wire of 1.9mm, but the closest I got was 1.8mm
This was from an electric motor repair workshop I found years ago, where I used to work and they were still trading after all these years and they even remembered me when I first came to get wire for my first Top Loaded Vertical Antenna.

Next stop was Bunnings for PVC 900mm Pipe and some fittings. Then Jaycar for some JB Weld glue.
I still had my ground plane metal mounting base and ground plane radial wires from my last antennas.
Talking to Drew VK3XU he said a solid piece of metal such as a roof or guttering was the best ground plane to use.
But I don't have any of that available unless I get on the roof, which I don't want to do, the roof is tiled anyway – no metal.

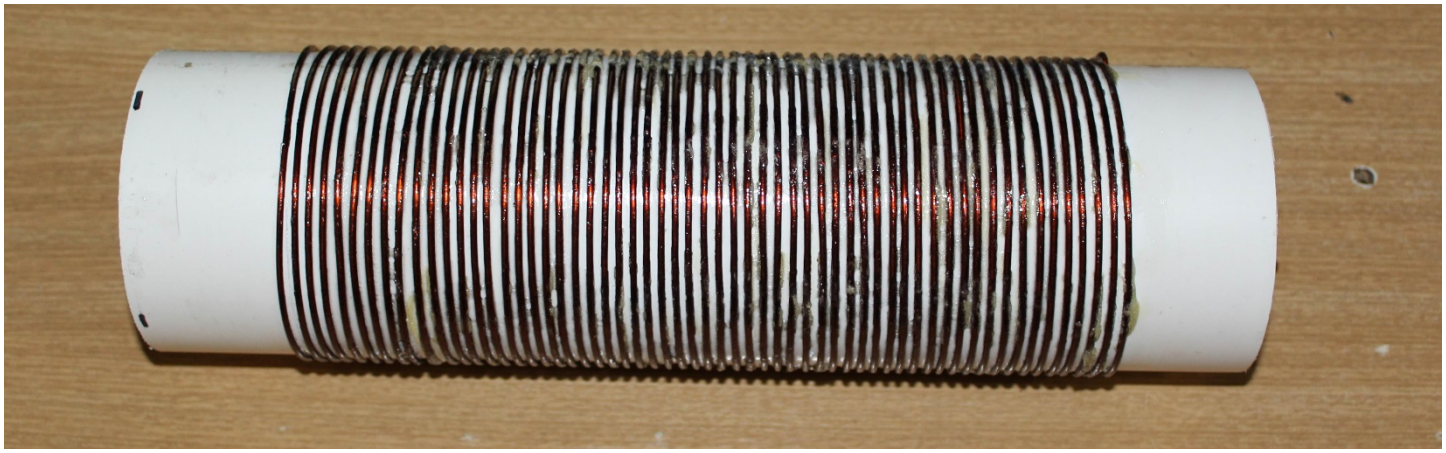
The loading coil is spaced at 4mm, this was achieved easy by winding two lots of wire at a time, this gave 4mm spacing after the second guide wire was removed, after some glue was placed to keep the first wire from springing out.

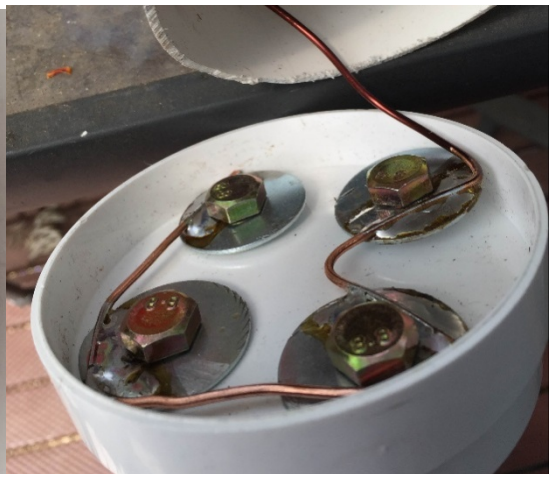
All the construction details are found in Drew Diamond Construction book, many Hamfests sell his books, he has quite a few.
The details for his Top Loaded Vertical Antenna are in "Radio Projects for the Amateur" Volume 3, published 2004.

A 6 meter length of aluminium mast was too big to bring home so I elected for a collapsible mast.
I did not want to wreck my good one for the sake of a vertical, so I got a cheap 9 meter collapsible mast one from EMDRC, as they were having a clearance sale. This way I can put it in the car and go portable in a clear park, with space to run the ground radials.

The next couple of weeks were spent on construction, winding the coil, drilling tubing and associated metalwork.
All this without a workshop bench or vice to hold things, so it's a bit rough at times.
Most of the time was waiting for different glue drying stages.
After having the previous two break, making this one a bit tougher was the aim, but I still think the coil section is the weakest and prone to damage if it was to fall down hard, so guying will be important.

Loading Coil



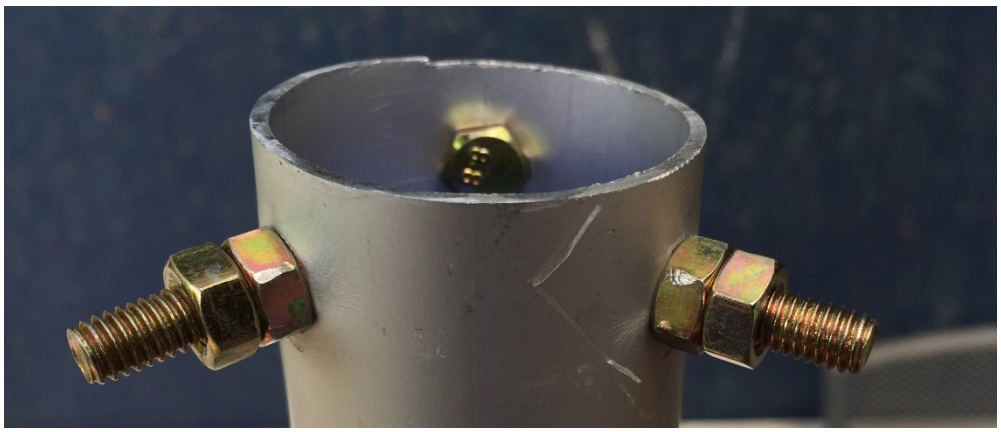


Top end soldered join to pipe

Bottom end soldered join to pipe

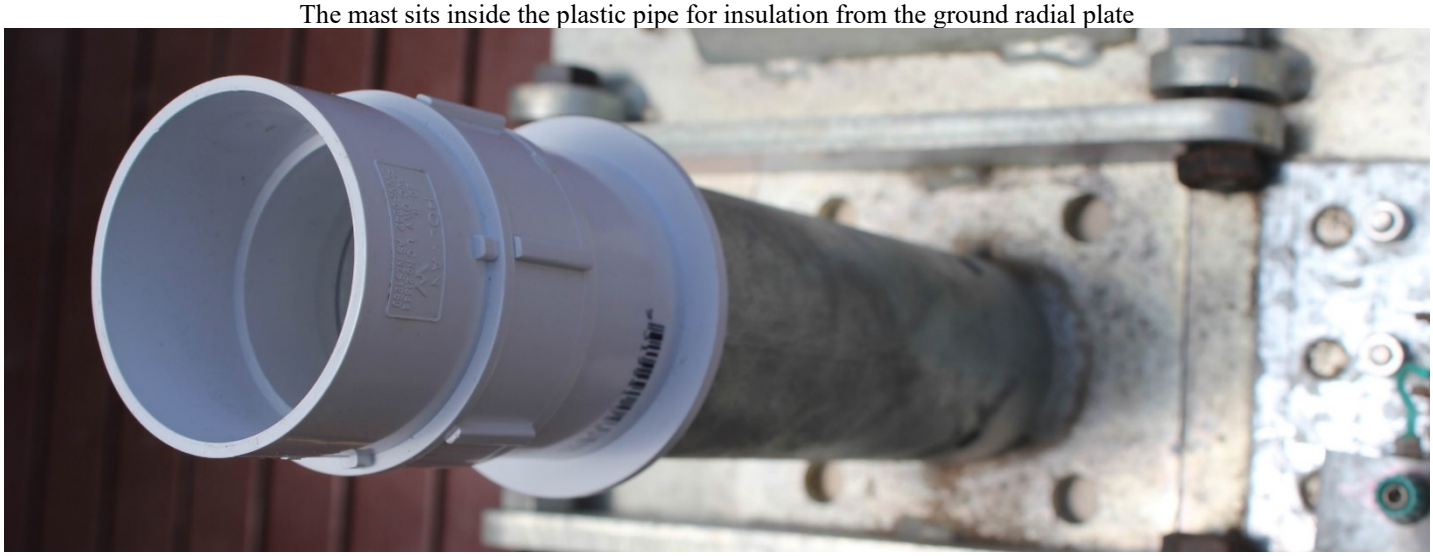
← Completed top section joined to loading coil, with JB Weld to seal out moisture

Top capacity hat screws for the "capacity hat" wires
This will get filled with JB Weld to keep out moisture

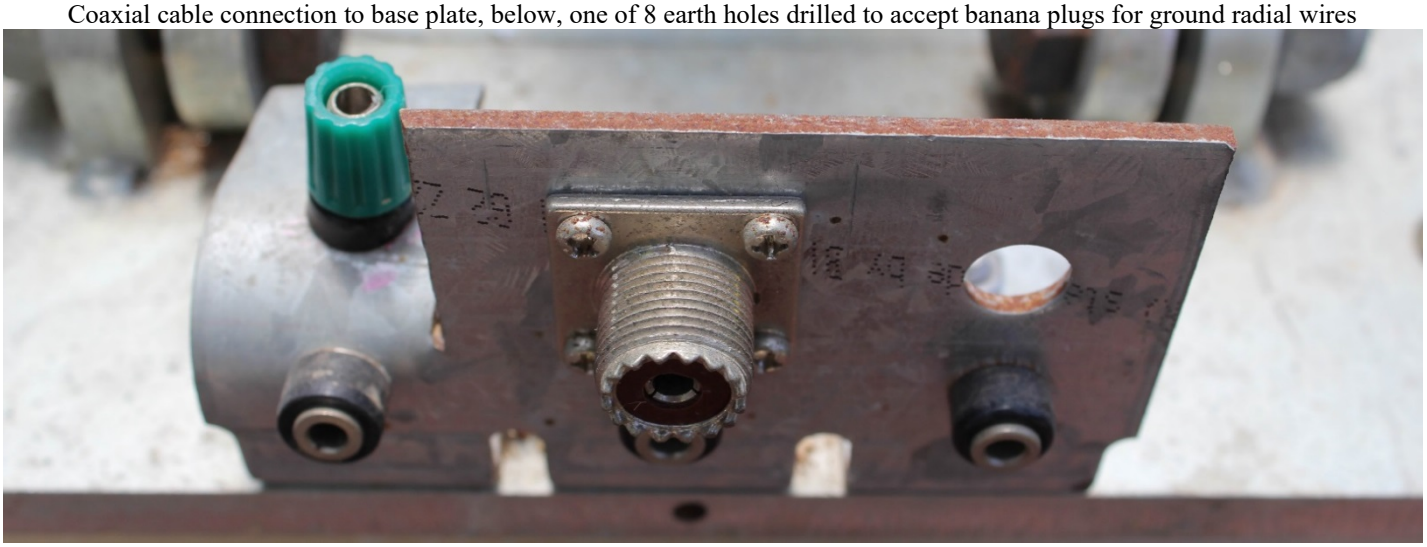


The base plate ground mount, which can tilt over if required

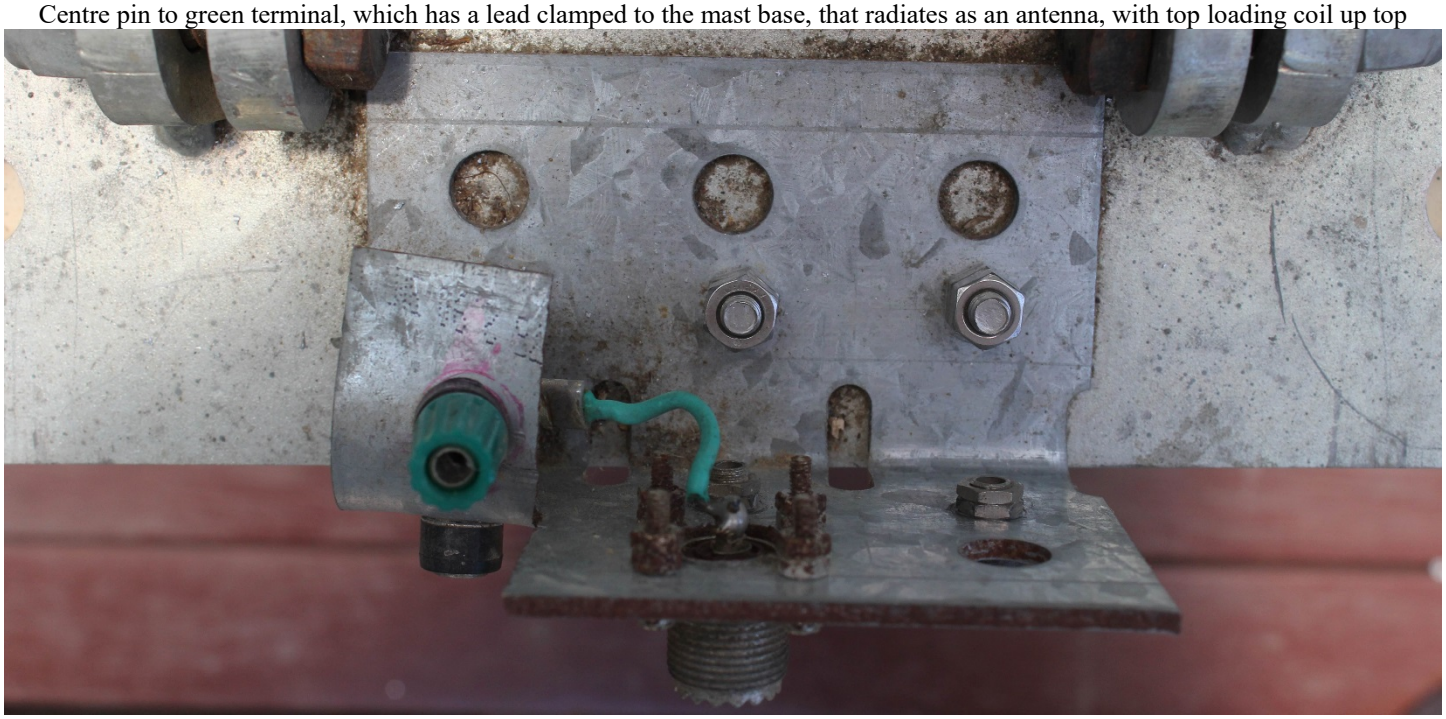
The mast sits inside the plastic pipe for insulation from the ground radial plate



Coaxial cable connection to base plate, below, one of 8 earth holes drilled to accept banana plugs for ground radial wires



Centre pin to green terminal, which has a lead clamped to the mast base, that radiates as an antenna, with top loading coil up top



Another one of the 8 earth holes drilled to accept banana plugs for ground radial wires

And another on the corner, in practice three ground radials suffice, but the more the better of course

A ground mat of chicken wire or a massive big plate of metal such as a roof is best, but for portable, wires on the ground will do.
I have previously worked all the Melbourne amateur stations on the morning AM Net with good signals in a clear open park with just three ground radial wires, each radial wire is 20 meters in length.

I use a fishing reel to unroll and wind up the radial wires, otherwise they tangle up real quick.
Each wire has a banana plug on the end and quickly plugs into the ground base steel plate.
If it's not windy you can be setup easily in fifteen minutes.

I need guys to keep the mast upright, the base plate is not heavy enough to keep it upright.
Remember if you operate in a public place, safety of the general public is your legal responsibility.
Don't forget EMR considerations also in a public place.

GROUNDING

Top Loaded Verticals require a good ground to work effectively.
I used to use three 20 meter long wires on the ground when portable with reasonable results.

I asked the question;

What type of ground system should I use?
How many radials?
Radial lengths?
What performance can be expected?
Optimum use of a fixed amount of wire?

Ground systems can take several forms:

1. A radial wire fan lying on the ground surface or buried a few inches.
2. A rectangular grid of wires
3. Ground rod(s).
4. Elevated wires in the form of a counterpoise or "capacitive" ground.
5. Various combinations of the above.

Since the mid 1930's the generally accepted "ideal" for a ground system has been the broadcast system using 120 0.4λ radials.

At 160 meters, most amateurs will not be using 0.4λ radials, each being 64 meters long, in a suburban block.

The instructions for an adequate ground system (from the internet) can be boiled down to:

1) Use at least 50 radials. Note, we are not talking about 0.25λ radials! Most backyards will only have room for 10 – 15 meter radials. Where possible the radials should be somewhat longer than the height of the vertical.

2) In the case of a very large top-hat, the radials should extend out to 1.25X the top-hat radius if possible.

3) When a large number of radials are used the size is not important. The wire needs to be strong enough to be installed and survive in its environment.

4) Almost any metal can be used for the radials but the usual choice is insulated copper house wiring because it is usually cheaper than the same wire bare.

The simplest ground system would be a single ground stake. From there we can add various numbers of radials of lengths up to 5 meters. It is also possible to have a radial system with ground stakes at the far ends of the radials.

As a very rough guide, 16 radials may give an efficiency of 10%, 32 radials brings it up to 11% and 64 radials brings it up to 11.5% The law of diminishing returns applies.

One frequently asked question is, "If I have a limited amount of wire available for radials how should I divide it up?"
In other words, "should I use a few long radials or many short radials?"

After reading a lot of stuff on the internet, for simple ease of setup, three long 20 meter radials would do.
For more efficiency and a bit more work, 8 radials of 10 meter length might give a little improvement.
Of course the type of soil and moisture and surroundings will all affect your signals.

If you’re operating from home then a tin roof or a big earth mat of chicken wire or similar would be a better way to go.
Or use 50 or more radial wires, buried in the ground if you can. This may not be possible in practice, but best to try.

TUNNING

To minimize tuner losses, you always want to start with the smallest amount of inductance possible in the "L" adjustment.
Peak the two capacitors, then add a bit more inductance if necessary.If you start out with too much inductance, not only will it be hard to tune, but the losses will be maximized.
Using a tuner with a rotary inductor makes this easier, and provides greater matching range.

For the same tuning components, a T-tuner has a wider matching range than a pi-net tuner.
However, the pi-net is a low-pass filter while the T-tuner is a high-pass filter.

TUNNING THE LOOP TO 160 METERS

While a vertical is best on 160 meters, having the loop to choose from might be handy sometimes.
The internal IC-9100 ATU would not tune the loop, so I tried my Tokyo HC-200AT.
The HC-200AT auto tuner matches all the bands including 160 meters. It handles 200 watts, a 25 watt AM carrier will not stress it.
It takes about a second to click its way through to a match on 160 meters. Every other band gets matched real quickly.
If I move up, say to 1860 kHz, it retunes the moment the radio goes into TX, without any intervention, so that's handy.
So now I don't need to modify the loop, which is good as I don't want to touch it, as it works so well on the other HF bands.

↑ Receiving on the Melbourne 1825kHz AM Net

↓ Acceptable VSWR to the loop via the match provided by the HC-200AT auto tuner, IC-9100 internal tuner is set to bypass

COMMENTS FROM DREW DIAMOND VK3XU

I asked Drew while on the 160 meter Net, what sort of mini ground radial system can I use with decent results.
He said to stay with using as many ground radials as possible.
He said a single insulated one quarter wavelength wire would do, but having more shorter radials would be better.
But he suggested using chicken wire, all joined up and soldered to form a square and bury it just below the ground on the lawn.

FINAL TESTING

I found some spare wire and decided to use the suggested 4 meter lengths for the top capacity 'hat' and used 5 meter lengths for the ground radials, with crimp lugs on the ends.
This way it will fit in a compact space.

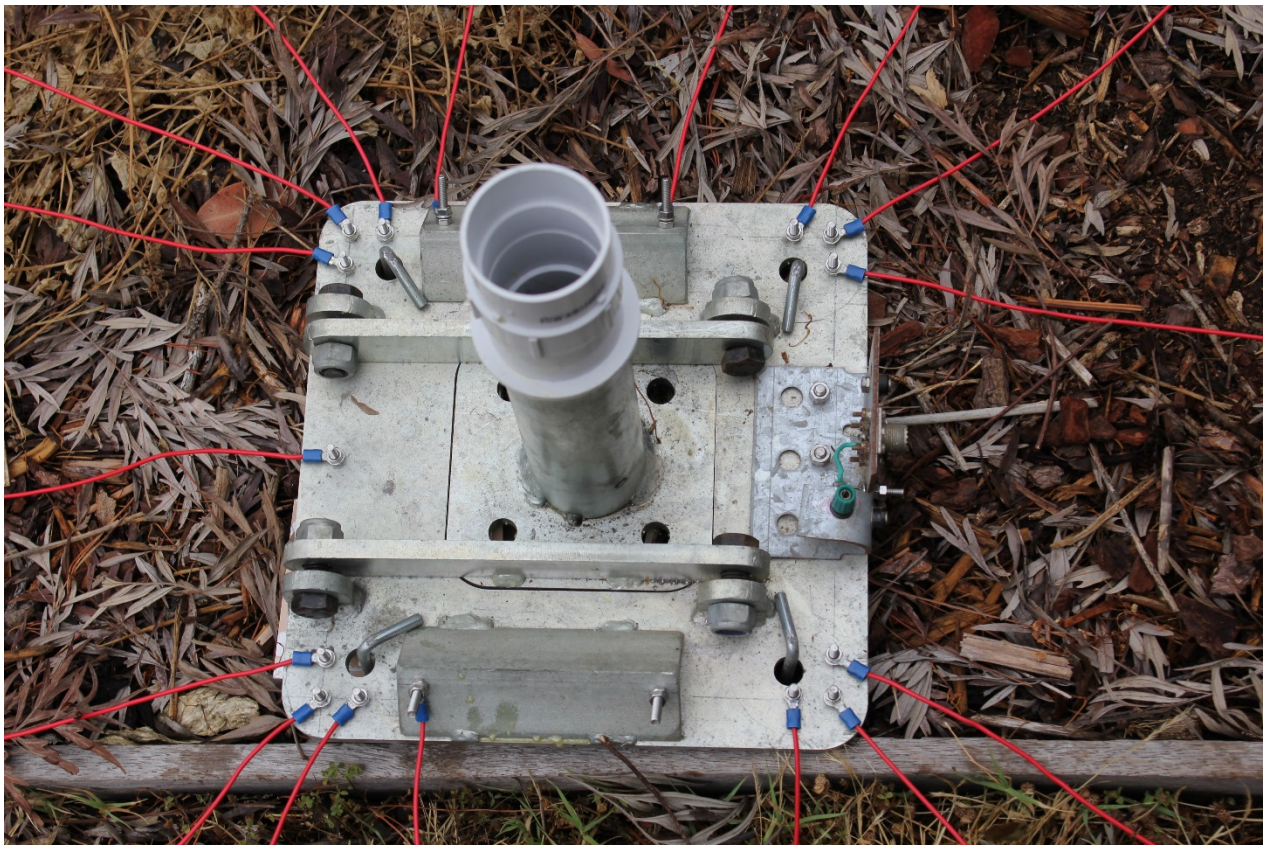
I made up 16 ground radials, using bright red wire to help stop persons tripping on it, whenever I go portable with it at a park.These also had soldered crimp lugs placed on the ends.
To ensure a reliable connection I added 20 screws as terminals to the ground block.
The base is so thick I broke 3 drills while drilling all the holes, but as I have lots of random spare drills collected over the years I had plenty to break, that's how it goes without cutting fluid.

A wire roll was purchased from Bunnings, which fits the top hat radial and all ground radials, so running them out and winding them up when operating portable will be easy without risk of cable tangles and all the hassles that creates.
I just put a little of one end of wire into the lug of the next wire on the reel and keep winding.

For a mast I used the EMDRC 9 meter collapsible mast, just using 2 sections for a 6 meter height.
I cut 4 lots of 30mm space lines in the lower mast length and placed hose clamps over the cut parts to have a reliable electrical connection between each mast sections.
Half way up I used guy ropes to keep it vertical so the capacity hat wires did not bear all the load of keeping it upright.
Then the capacity hat wires were then placed and tunned roughly with my FG-01 antenna analyser.

ON AIR RESULTS

To compare the performance against the HF loop, I got permission from the XYL to have a temporary, testing only, session.
Under her watchful eyes the vertical was put up and ground wires laid out and a very temporary coax run into the house was done.
It was time consuming with all the new screws so this won't be a portable setup on such a scale of 16 ground radials.



The base ground plate with 16 red radial wires attached, ready for the mast

Red radial wires lying on the garden and back lawn, a very temporary testing setup, 5 meters of radial wires just fits in the area
The block is on a slope, so tiles as levelling packing used under the base plate, so mast will be vertical in the air
Tent pegs keep the antenna ground plate base firmly in place and level

THE RESULTS

After erecting the mast and tying all the support guys off and capacity hat wires it was time to test it.
As I had to use the existing coax under the house, I added some extra thin coax to reach the antenna, a total run of about 40 meters.
Thin coax does not have much loss on 160 meters.

Because of this I could not switch between the loop and vertical for a real time comparison, but received stations were way up.

I tested it with the FG-01 analyser but it was no near 1825 kHz, so more playing with capacity hat lengths and angles to fine tune.

The HC-200AT ATU quickly placed it into tune with a perfect 1:1.2 VSWR on 1825 kHz and all of the 160 meter band.
The HC-200AT ATU will only match the loop,on 160 meters, to about 1:1.7 VSWR on most attempts.
The actual IC-9100 internal ATU will match the top loaded 160 meter vertical easy.
The ATU will tune the top loaded vertical to any HF band, every WARC band gets matched, so I could swap to a HF vertical, but how efficient is another thing, but the choice would be there and depending on conditions might be a handy option at times.

Most stations on the 160 meter Net that were near S9 previously are 10 dB to 20 dB up in signal strength.
All stations report an increase in my signal to them, for some it was quite significant.
Some even said they used to hear about every fourth word I said and hard to copy, but with the vertical I am now an “armchair copy”.

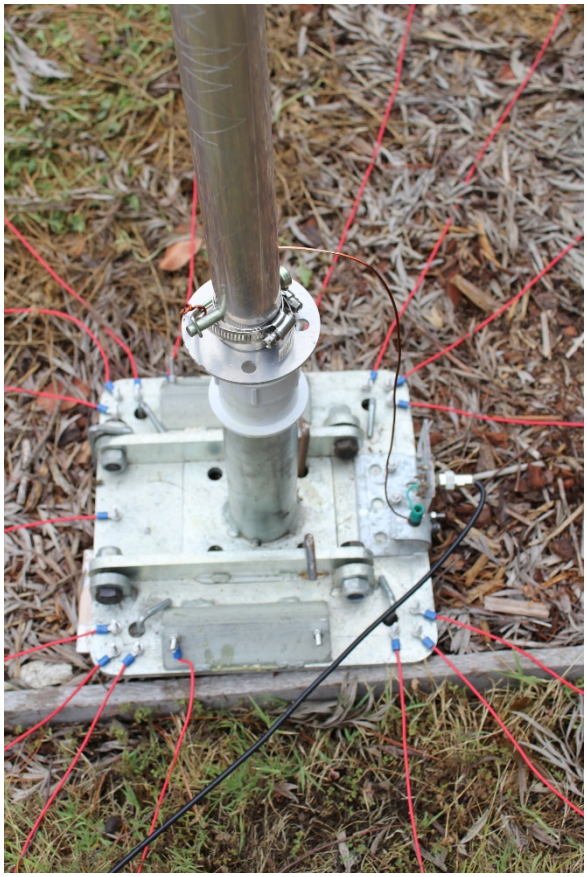
There was a bit less broadcast station QRM with the vertical, but it was faintly there.
I am getting a broadcast band filter soon so that problem will get sorted.
Verticals are supposed to be noisier, but I reckon I have a bit less noise than the loop, well on 160 meters anyway.

Drew VK3XU suggested I bury all the ground radials for better earth performance and to remove any tripping hazard.
No point doing that until I find out if the XYL lets it remain permanently.

On the ground ready to lift

Installed and working very well

The guys keep it rock solid straight



Mast sits neatly on the insulator

Drew VK3XU 160 meter Top Loaded Vertical design works a treat.

THE RESULTS WITH ALTERED COUNTERPOISE RADIALS

With the ability to monitor my own transmissions in real time, with the web SDR receiver located just 13km away, any changes to the setup can be tracked. With 16 ground radials I was received by the web SDR at S7 to S8.

I removed all 16 radials and ran a 50 meter counterpoise earth radial from the mast to the rear fence about 3 meters away, then headed west along the back fence to the side westerly fence and ran the wire out to its full length.
The wirecaught on every single thing it could find, a lot walking back to untangle it and stop any kinks, eventually it was run.
I just had it lying on the ground as best as possible as a temporary install so I could test it out.

Back in the shack a test to the web SDR had me still around S7 to S8.
Time to run another 50 meter counterpoise earth radial from the mast to the east side fence and see if that helps.

So another run, keeping it from tangling up, fighting my way through bushes, the second counterpoise earth radial was ready to test.
Ham radio is hard work, who says I don't get any exercise…

Back in the shack a test to the web SDR had me steady at S8.
It's handy to be able to listen to your own voice, you really need to maximise the microphone gain when using AM.
Due to the law of diminishing returns and no more fences to run wires on, two counterpoise earth radials will do.
Just for a comparison I tried the HF loop into the web SDR, about S3, in with the noise, no audio heard, that's just 13km away.

This saves having to dig 16 little 5 meter long trenches in the back yard.
Now the only trench is one 3 meter length, both counterpoise and the coax will be hidden in that, with some mulch topping.
The two counterpoise runs were clipped along the lower fence line to keep them neat, this took quite a while all working at ground level, my legs and back needed a rest after all that.This is as close to "gardening" as I will ever get…

YOU'VE GOT TO MOVE IT

After it was all done, next day, the XYL decided it was an eyesore for the neighbours and I should move it a few meters east.
This was after all the wires had been cut to length and tucked neatly into the fence palings.
As this was the only way to appease and obtain long term approval for the mast to remain in the backyard, it had to be moved.
It was moved east about 3 meters and the 2 counterpoise were either cut and joined or shortened accordingly.
The angles of the capacity hat leads are now closer to the mast, which is going to affect the tunning match.

Back in the shack and I was still S8 into the web SDR, but my audio was weaker.
The IC-9100 internal ATU took many attempts until it finally managed to tune it.
More experimentation with counterpoise lengths required.
The mast is now closer to a large tree, but nothing I can do about that.
Next job is to dig a trench to bury the coax and counterpoise wires back to the fence line, of 3 meters length.


Moved base plate


A bit more hidden


Right in the far yard corner

Now to convince the XYL to let it remain in service.

~Mick VK3CH

Broadcast Band Rejection Filter - 160 Meter Band QRM Killer

One of the hassles of operating on 160 meters is often strong commercial AM stations causing interference.
The internet is full of suggestions to combat this problem.
It seems the better the antenna you use for 160 meters just seems to increase the problems from Broadcast Band stations.

It isn't unusual for a 160 meter antenna to pick up as much as a watt of signal--more than enough to light a flashlight!
In some cases, the receiver has minimal bandpass filtering, relying on low pass filtering and the absence of strong MF/LF signals.

Your receiver, no matter what frequency it receives, is designed to accept only a certain maximum amount of radio frequency energy in the front- end. If more energy is present, then one or more of several overload conditions results. The overload could result from a desired station that is too strong. In other cases, there are simply too many signals within the passband for the receiver front-end to accommodate. In still other cases, a strong out-of-band signal is present. Several different receiver problems result from the various types of overload, all of which are species of intermodulation and/or cross modulation.

If you tune across the shortwave bands, especially those below 10 or 12 MHz, and note an AM BCB signal that seems like it is hundreds of kilohertz wide, then you are witnessing blanketing. It drives the mixer or RF amplifier of the receiver clean out of its mind, producing a huge number of spurious signals, and apparently a very wide bandwidth.

Your receiver can only accommodate a certain amount of RF energy in its front-end circuits. This level is expressed in the dynamic range specification of the receiver, and is hinted by the third-order intercept point and -1 dB compression point specifications.
The strong out-of-band signal takes up so much of the receiver's dynamic range “head room” that only a small amount of capacity remains for the desired signal. The signal level of the desired signal is thereby reduced to a smaller level.
In some cases, the overload is so severe that the desired signal becomes inaudible. If you can filter out or otherwise attenuate the strong out-of-band signal, then the head room is restored, and the receiver has plenty of capacity to accommodate both signals.

Some modern receivers are equipped with one or more switchable attenuators in the front-end. Some receivers also include an RF gain control that sometimes operates in the same manner. Some receiver operators use external in-line single-range or switchable attenuators for exactly the same purpose. The idea behind the attenuator is to reduce all of the signals to the front-end enough to drop the overall energy in the circuit to below the maximum level that can be accommodated without either overload or intermodulation occurring at significant levels. The attenuator reduces both desired and undesired signals, but the perceived ratio is altered when the receiver front-end is de-loaded to a point where desensitization occurs, or inter-mods and harmonics pop up.

The Filter Solution

One of the best solutions is to filter out the offending signals before they hit the receiver front-end, while affecting the desired signals minimally. This task is not possible with the attenuator solution, which is an “equal opportunity” situation because it affects all signals equally. A signal that is outside the passband of a frequency selective filter: it is severely attenuated. It does not drop to zero, but the reduction can be quite profound in some designs.

Signals within the receiver’s passband are not unaffected by the filter. The loss for in-band signals is, however, considerably less than for out-of-band signals. This loss is called insertion loss, and is usually quite small (1 or 2 dB) compared to the loss for out-of- band signals (lots of dB).

Several different types of filter are used in reducing interference. A high-pass filter passes all signals above a specified cut-off frequency (Fc). The low-pass filter passes all signals below the cut-off frequency. This filter is similar to the type of filter that hams using HF transmitters place between the transmitter and antenna to prevent harmonic radiation from interfering with television operation.

A bandpass filter passes signals between a lower cut-off frequency (FL) and an upper cut-off frequency (FH). A stop-band filter is just the opposite of a bandpass filter: it stops signals on frequencies between FL and FH, while passing all others. A notch filter, also called a wave trap, will stop a particular frequency (Fo), but not a wide band of frequencies as does the stopband filter. In all cases, these filters stop the frequencies in the designated band,while passing all others. More or less.

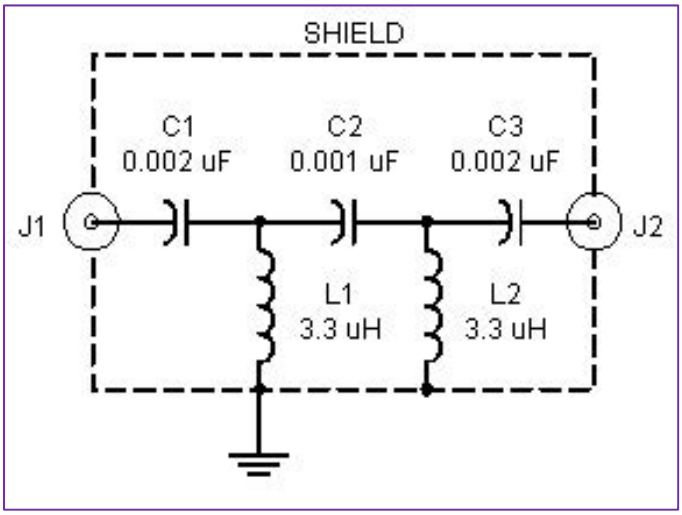
The positioning of the filter in your antenna system is ideally as close as possible to the antenna input connector.
The best practice, if you have the space at your operating position, is to use a double-male coaxial connector to connect filter output connector to the antenna connector on the receiver.

A short piece of coaxial cable can connect the two terminals if this approach is not suitable in your case.
Be sure to ground both the ground terminal on the receiver and the ground terminal of the filter (if one is provided).

Otherwise, depend on the coaxial connectors’ outer shell making the ground connection.

High-Pass Filters

One very significant solution is to use a high-pass filter with a cut-off frequency between 1700 and 3000 KHz. It will pass the shortwave frequencies, and severely attenuate AM BCB signals in both MW and LW bands, causing the desired improvement in performance. Below shows a design used for many decades. It is easily built because the capacitor values are 0.001 µF and 0.002 µF (which some people make by paralleling two 0.001 µF capacitors).

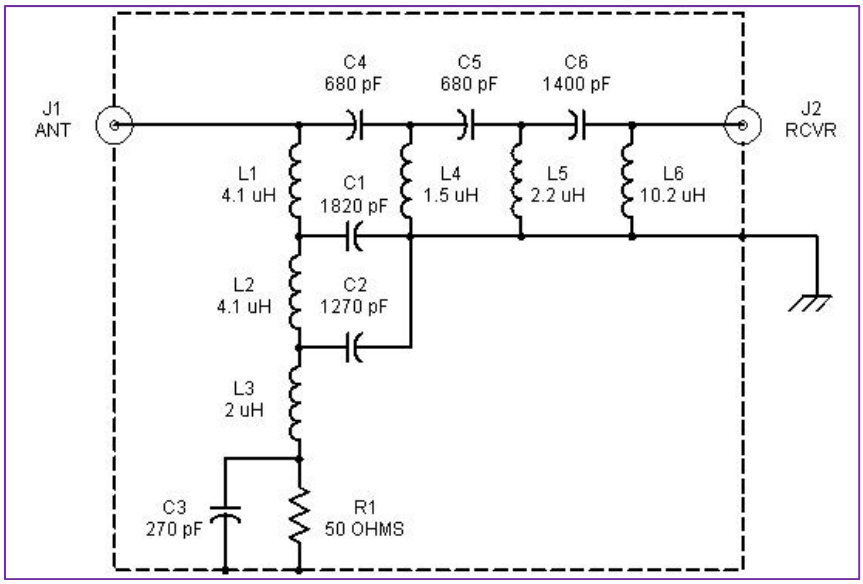


The inductors are both 3.3 µH, so can be made with toroidal cores. If the T-50-2RED cores are used (AL = 49), then 26 turns of small diameter enamelled wire will suffice. Or if the T-50-15 RED/WHITE cores are used (AL = 135), then 15 turns are used. The circuit produces pretty decent results for low effort.

But there is a better way....

Absorptive Filters

The absorptive filter solves a problem with the straight high-pass filter method, and produces generally better results at the cost of more complexity. This filter consists of a high-pass filter (C4-C6/L4-L6) between the antenna input (J1) and the receiver output (J2). It passes signals above 3 MHz and rejects those below that cut-off frequency. It also has a low-pass filter (C1- C3/L1-L3) that passes signals below 3 MHz What is notable about this filter, and fromwhich it takes its name, is the fact that the low-pass filter is terminated in a 50 ohm dummy load. This arrangement works a little better than the straight high-pass filter method because it absorbs energy from the rejected band, and reduces (although does not eliminate) the effects of improper filter termination.



Some of the capacitor values are non-standard, but can be made using standard disk ceramic or mica capacitors using combinations in Table 1:

Table1

C1:1,820pF	Use1000pF(0.001µFor1 nF)inparallelwith820pF
C2:1,270pF	Use1000pFand270pF in parallel
C6:1,400pF	Use1000pF,180pFand220pFinparallel.

Theothercapacitorsarestandardvalues.
The coils area bit more difficult to obtain.
Although it is possible to use slug- tunedcoilsobtainedfromcommercialsources(e.g.Toko),orhomebrewed,thisisnotthe preferred practice.
Adjusting this type of filter withouta sweep generator might prove daunting due to interactions between the sections.
A better approach is to use toroidcorehomebrew inductors. Thetoroidal cores reduce interaction between the coil's magnetic fields,sosimplifiesconstruction.PossiblealternativesareshownbelowinTable2:

Table2

Coil	Value	Core	A_L Value	Turns
L1	4.1µH	T-50-15RED/WHITE	135	17
L2	4.1µH	T-50-15RED/WHITE	135	17
L3	2µH	T-50-15RED/WHITE	135	12
L4	1.5µH	T-50-2RED	49	18
		T-50-6YELLOW	40	20
L5	2.2µH	T-50-2RED	49	21
		T-50-6YELLOW	40	24
L6	10.2µH	T-50-2RED	49	46
		T-50-6YELLOW	40	51

For all coils use wire size to #24 to #30 AWG enamel insulation.

The dummy load used at the output of the low-pass filter, R1, can be madeusinga51ohmcarbonormetalfilmresistor,ortwo100ohmresistorsinparallel.Ina pincha 47 ohm resistor could also be used, but is not preferred.
In any event, use only noninductiveresistorssuchascarboncompositionormetalfilm1/4to2-wattresistors.

Shielding

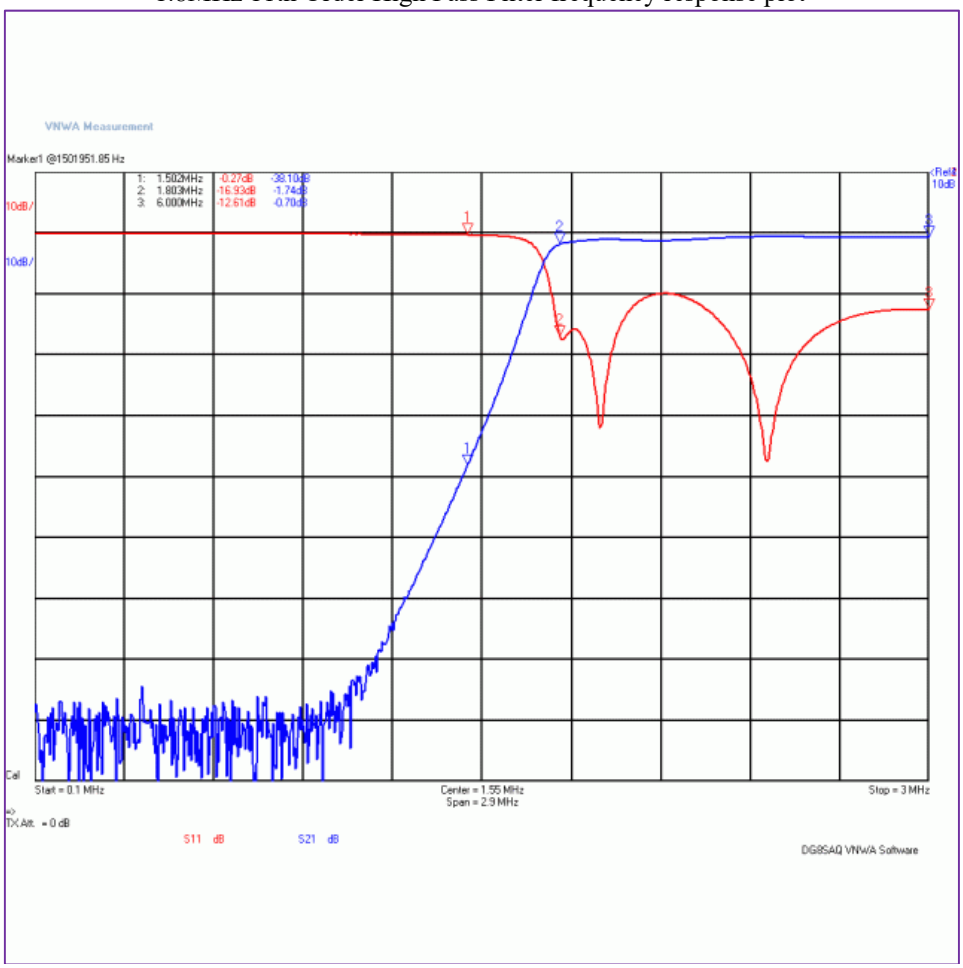
Shielding is a non-negotiable requirement of filters used for the QRM reduction task.
Otherwise, signal will enter the filter at its output and will not be attenuated.
Use an aluminium shield box of the sort that has at least 5-6 mm of overlap of the flange between upper and lower portions.

A LOCAL FIX

Minikits have several filters, the best choice I found was the 1.8MHz 11th Order High Pass Filter, Product Code: HPF11-1M8 KIT.
1.8MHz High Pass Filter designed to provide protection to receivers from strong signals in the AM broadcast band, and provides over 35dB attenuation at 1.5MHz.
Low loss NPO ceramic capacitors have been used along with wire wound high Q inductors to reduce RF losses.
The filter has been designed to protect receivers from overload or inter modulation caused by very high AM broadcast band signals.

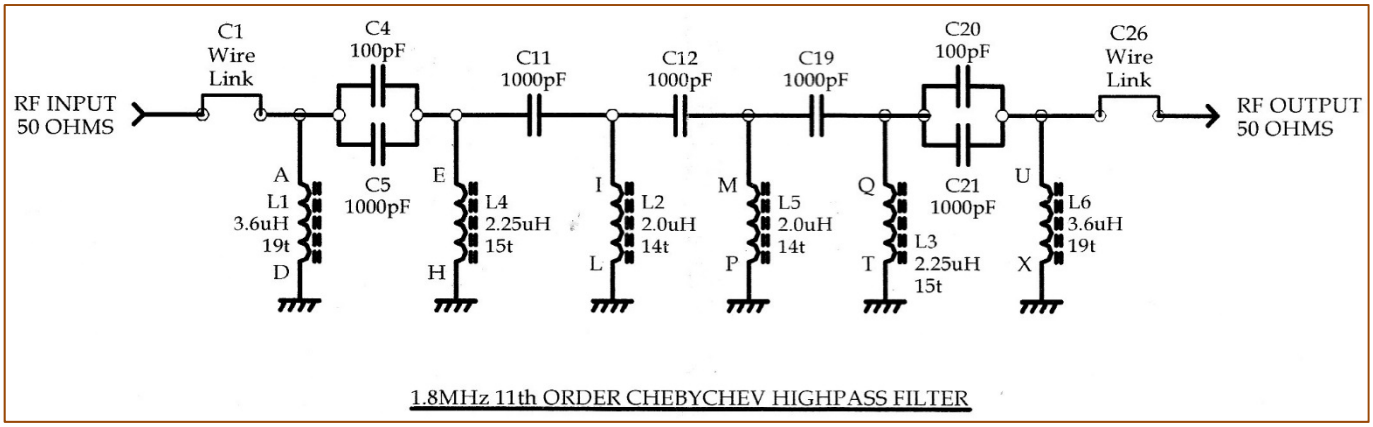
Specifications	
High Pass Filter:	1.8MHz 1th order Chebychev
Insertion Loss:	< 1.5dB from 1.8 to 100MHz
Return Loss:	> 10dB from 1.8 to 100MHz
Input Power:	50 Watts PEP SSB Maximum on 1.8MHz (100W PEP >3.5MHz)

1.8MHz 11th Order High Pass Filter frequency response plot



The filter uses a number of 1206 size 630v NPO SMD capacitors that are easily fitted to the bottom side of the board, and the inductors are wound using T50-1 Toroids.
The filter essentially is no tune, and no alignment or test equipment is required.
The filter can be fitted on most 100W HF Transceivers designed for up to 50 watts PEP on 1.8MHz, and 100 watts PEP above 3MHz.
As my eyes strain now with SMD components, plus being lazy, I got my kit premade and tested.

All the details are at https://www.minikits.com.au/electronic-kits/filter-kits/hf-highpass-filters/HPF11-1M8



The Minikits filter is effective; BCI QRM is reduced from 160 meter operation, on the vertical, with the filter inline.
But with the loop, BCI QRM only reduced a little bit. I have two strong broadcast band stations a few km away that seem to get into everything, even with images across 80 meters, but only at certain times of the day.
The main culprit is a community radio station running 5kW, located just 5.98 km away from the QTH.

A CHEAP PI-COUPLER ANTENNA MATCHING UNIT FOR 160 METERS

To save having a fully-fledged automatic antenna tuner, just for using on 160 meters, you can build the Drew VK3XU PI-Coupler Antenna Matching Unit for 160 Meters.

I am still scrounging for parts, so a project for next month.

Just two items to get as the circuit shows.

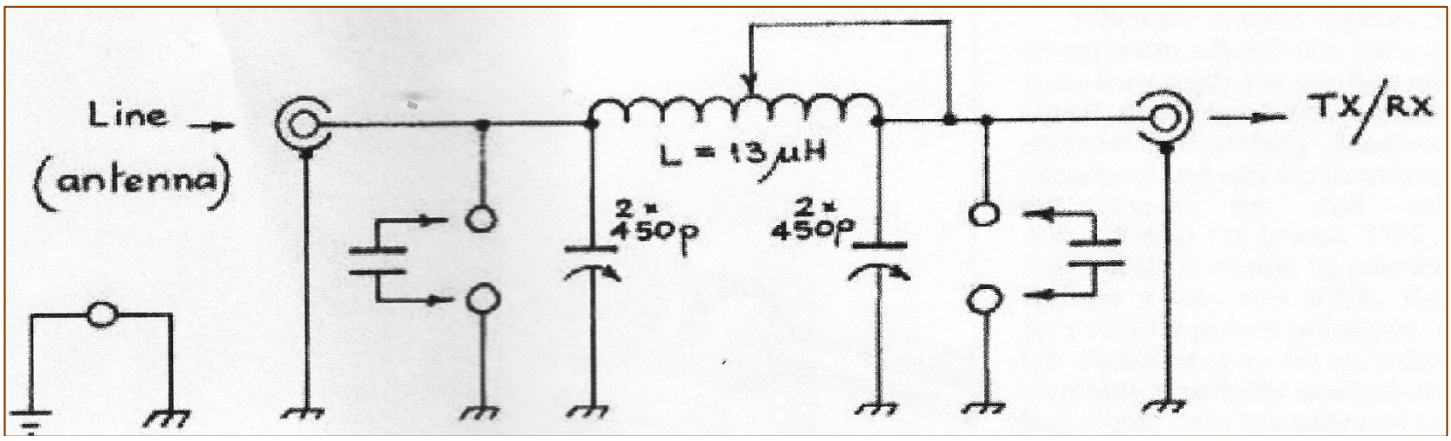
In some cases you may need the optional plug in capacitors, 1500pF suggested.
You should be able to pick these items up at any decent Hamfest.

Or you can make your own inductor coil.
The 13µH coil is made from 18 turns of 1.9mm copper wire, with a 90mm former and a winding pitch of 5mm.

If you want get really serious a roller inductor is the best choice.

Drew's complete article appears in "Radio Projects for the Amateur" Volume 3, published 2004.

You can find these books on sale at the larger Hamfests, or get it from the WIA Online Bookshop.



VK3XU PI-Coupler Antenna Matching Unit for 160 Meters - Circuit

~Mick VK3CH

Listening to the Melbourne AM Coffee Club Net via the Internet

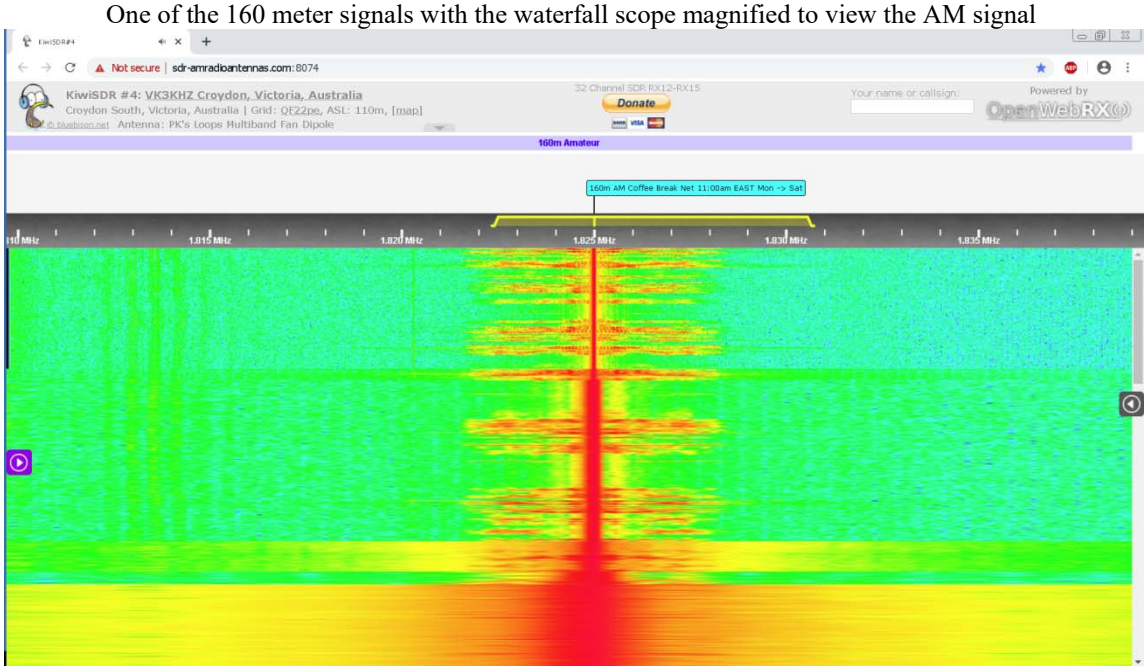
You can listen to the AM Net on 1.825MHz anytime it is on via the internet.
Just go to http://sdr-amradioantennas.com:8074/

All the parameters for mode, AGC, audio filtering, are all user selectable.
I use wideband AM and it sounds very good.
The web SDR is located in Croydon, Melbourne, just 13km from my QTH.

I often use the web SDR to copy weaker stations or when I have local QRM on the band.
So it is like a dual receiver system, but via the internet.
The web SDR has no interference on it and must be in a very good non noisy location.

The website lists the info of,
VK3KHZ Croydon South, Victoria, Australia
Grid: QF22pe, ASL: 110m, Antenna: PK's Loops Multiband Fan Dipole

One of the 160 meter signals with the waterfall scope magnified to view the AM signal



You can also listen to other signals from 500 kHz to 30MHz on the web SDR.

~Mick VK3CH

Amplitude Modulation Notes

Amplitude modulation or AM as it is often called is one of the earliest used forms of modulation it is still used today, mainly for long, medium and short wave broadcasting and for some aeronautical point to point communications.

One of the key reasons for the use of amplitude modulation was its ease of use.

The system simply required the carrier amplitude to be modulated, but more usefully the detector required in the receiver could be a simple diode based circuit.

This meant that AM radios did not need complicated demodulators and costs were reduced - a key requirement for widespread use of radio technology, especially in the early days of radio when ICs were not available.

Amplitude modulation history

The first amplitude modulated signal was transmitted in 1901 by a Canadian engineer named Reginald Fessenden.
He took a continuous spark transmission and placed a carbon microphone in the antenna lead.
The sound waves impacting on the microphone varied its resistance and in turn this varied the intensity of the transmission.
Although very crude, signals were audible over a distance of a few hundred metres, although there was a rasping sound caused by the spark.

With the introduction of continuous sine wave signals, transmissions improved significantly, and AM soon became the standard for voice transmissions.

Nowadays, amplitude modulation, AM is used for audio broadcasting on the long medium and short wave bands, and for two way radio communication at VHF for aircraft.

However as there now are more efficient and convenient methods of modulating a signal, its use is declining, although it will still be very many years before it is no longer used.

Amplitude modulation applications

Amplitude modulation is used in a variety of applications. Even though it is not as widely used as it was in previous years in its basic format it can nevertheless still be found.

Broadcast transmissions: AM is still widely used for broadcasting on the long, medium and short wave bands. It is simple to demodulate and this means that radio receivers capable of demodulating amplitude modulation are cheap and simple to manufacture. Nevertheless many people are moving to high quality forms of transmission like frequency modulation, FM or digital transmissions.

Air band radio: VHF transmissions for many airborne applications still use AM. . It is used for ground to air radio communications as well as two way radio links for ground staff as well.

Single sideband: Amplitude modulation in the form of single sideband is still used for HF radio links. Using a lower bandwidth and providing more effective use of the transmitted power this form of modulation is still used for many point to point HF links.

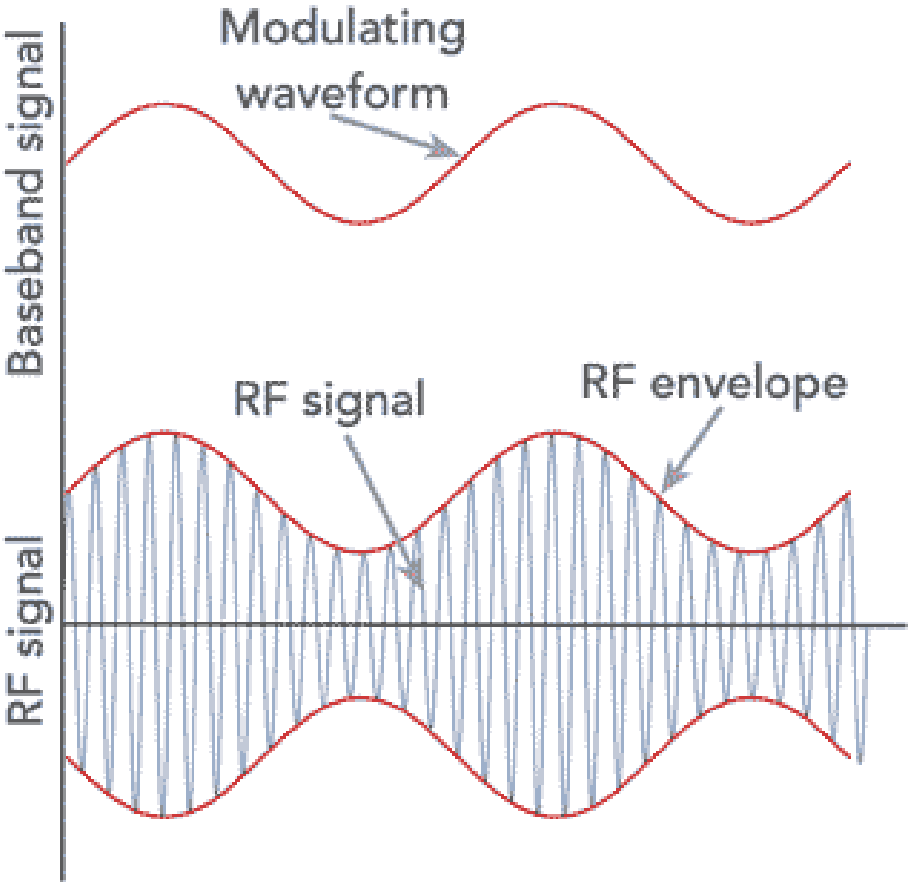
Quadrature amplitude modulation: AM is widely used for the transmission of data in everything from short range wireless links such as Wi-Fi to cellular telecommunications and much more. Effectively it is formed by having two carriers 90° out of phase.
These form some of the main uses of amplitude modulation. However in its basic form, this form of modulation is being used less as a result of its inefficient use of both spectrum and power.

What is amplitude modulation?

In order that a radio signal can carry audio or other information for broadcasting or for two way radio communication, it must be modulated or changed in some way.
Although there are a number of ways in which a radio signal may be modulated, one of the easiest is to change its amplitude in line with variations of the sound.

In this way the amplitude of the radio frequency signal varies in line with the instantaneous value of the intensity of the modulation. This means that the radio frequency signal has a representation of the sound wave superimposed in it.

In view of the way the basic signal "carries" the sound or modulation, the radio frequency signal is often termed the "carrier".



Amplitude Modulation, AM
From the diagram, it can be seen that the envelope of the signal follows the contours of the modulating signal

Amplitude demodulation

Amplitude modulation, AM, is one of the most straightforward ways of modulating a radio signal or carrier.
It can be achieved in a number of ways, but the simplest uses a single diode rectifier circuit.
Other methods of demodulating an AM signal use synchronous techniques and provide much lower levels of distortion and improved reception where selective fading is present.
One of the main reasons for the popularity of amplitude modulation has been the simplicity of the demodulation.
It enables costs to be kept low - a significant advantage in producing vast quantities of very low cost AM radios.

Advantages & disadvantages of amplitude modulation, AM

As with any technology there are advantages and disadvantages to be considered.

Advantages
It is simple to implement
It can be demodulated using a circuit consisting of very few components
AM receivers are very cheap as no specialised components are needed

Disadvantages

It is not efficient in terms of its power usage
It is not efficient in terms of its use of bandwidth, requiring a bandwidth equal to twice that of the highest audio frequency
It is prone to high levels of noise because most noise is amplitude based and obviously AM detectors are sensitive to it

Although in the current technological climate, AM in its basic form is not nearly as effective as other modes that can be used, it is still retained in many areas like broadcasting, because of the number of users. However, it is likely that with time, its use will decrease still further and ultimately many AM transmissions will cease. However, its derivatives like quadrature amplitude modulation are widely used as they offer a very effective form of modulation, especially for data transmission.

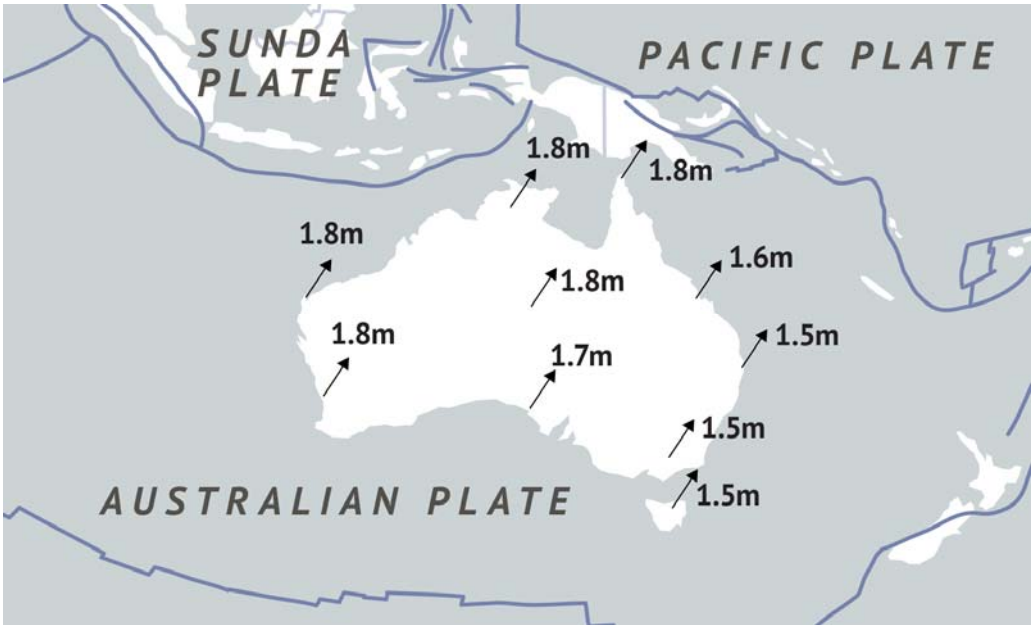
~Internet

VICTORIA – ON THE MOVE

On New Year's Day, NSW and Victoria jumped north by 1.8 metres – while the rest of the country remained firmly fixed in place.
The change is being made to fix a 1.8 metre inaccuracy that has crept into our GPS coordinates, caused by Australia slowly drifting north.
It will hopefully improve the accuracy of the blue location dot on Google Maps – and dispense with the days of seeing your Uber driver rock up on the wrong side of the road.
Australia sits atop one of the fastest-moving tectonic plates in the world. We move about seven centimetres north-east every year.
"That's about the speed your hair or fingernails grow," says NSW Surveyor General Narelle Underwood, who led NSW's 'jump'.

In the days of paper maps our tectonic drift did not pose a real problem. The continent might move but the distance from Melbourne to Sydney stayed the same. That meant Australia could get away with the slight inaccuracy that has crept in since we last set our coordinates in 1994.But paper maps have gone the way of the dinosaurs; we use GPS now. And GPS notices.
That's because GPS satellites precisely locate you on the surface of the Earth.

Because Australia's underlying map data is now off by about 1.8 metres, it throws off the accuracy of the GPS location. The blue dot is accurate, but the underlying map is not."Effectively the coordinate you have from your GPS has already moved the 1.8 metres – it's the mapping data that has been left behind," says Dr John Dawson, director of positioning at Geoscience Australia, the federal government department supervising the fix.



Add in the inaccuracy of GPS itself – it is accurate to about five metres – and that explains why you can sometimes open Google Maps and discover yourself trapped inside a building or drowning in a lake.To fix this, all Australian states and territories have agreed to update their coordinates by June. However, they are all doing it at their own speeds.

On January 1, the Victorian and NSW governments updated the coordinates of every road, property and geographical feature in their states, essentially moving the south-eastern seaboard 1.8 metres north-east overnight.
Official government road maps and property boundaries will now line up perfectly with GPS location data.
"The real importance with data is it all lines up. Roads, people's property boundaries all line up," says Ms Underwood.

It will take some time for companies like Google to pick up and implement the new data. But when they do, you will enjoy slightly more accurate satellite navigation.

Towards pinpoint accuracy

The coordinate shift is part of a wider project: super-accurate GPS.
The federal government has invested $225 million to upgrade Australia's GPS accuracy to a resolution of just 10 centimetres.
To do that, Geoscience Australia is busy building GPS stations across Australia, and has plans to launch two new satellites into orbit over the continent - the necessary infrastructure to calculate position down to a centimetre.
The project is handy for the average person, but its real value is in the future. Driverless cars, for example, need precise GPS data to know which lane they are in, and driverless tractors need to be able to get right up to the fenceline without ploughing it down.

~Internet

FCC SEEKS TO REMOVE 3 GHZ HAM RADIO BAND

ARRL reports the FCC has formally adopted proposals to remove theUSA Amateur and Amateur-Satellite Service 3 GHz Band and is inviting comments. By proposing to delete the existing non-federal secondary allocationsfrom the 3.3 - 3.55 GHz band, we are taking an important initial steptowards satisfying Congressdirectives and making as much as250 megahertz of spectrum potentially available for advanced wirelessservices, including 5G, the FCC said in the Introduction to itsNotice of Proposed Rulemaking.

NEW ZEALAND SHORT-TERM MANAGEMENT RIGHTS IN 3.5 GHZ BAND FOR 5G

In December 2019 the New Zealand Government approved the allocation,via auction, of short-term rights to an unused portion of 3.5 GHzspectrum. These rights will be allocated as national managementrights for a term beginning mid-2020 until 31 October 2022.3.5 GHz is the first spectrum band to be allocated for 5G services inZL.

SOLAR MINIMUM IS OFFICIALLY 'DEEP.'

2019 has just broken a Space Age record for days without sunspots. Moreover, an international panel of scientists led by NOAA and NASApredicts that Solar Minimum could deepen even further, not reachingits lowest point until April of 2020. "BUT WHAT IS A SUNSPOT?"Well they are cool planet-sized areas on the Sun where intensemagnetic loops poke through the star's visible surface.

EMERGENCY COMMUNICATIONS

WIA EMCOM HF frequencies (as per IARU-R3 EMCOM band plan on the WIA or IARU-R3 website)
Amateurs seeking to establish emergency communication should use these EMCOMM frequencies in the first instance, or repeaters if available.

As an IARU member society, the WIA has adopted these recommended frequencies:

3.600 MHz
7.110 MHz
14.300 MHz
18.160 MHz
21.360 MHz

These "Centre of Activity" frequencies are not spot frequencies or net frequencies.
They are recommended as starting points for emergency traffic which may extend 5 kHz above or below the designated centre frequency.Emergency Communication is one of the three main reasons Radio Amateurs have access to RF Spectrum. Please assist if and when you can.

CQ

The telegraph call CQ was born on the English Telegraph over a century ago as a signal meaning "All stations. A notification to all postal telegraph offices to receive the message." Its meaning was close to the present meanings of QNC and QST. Like many other telegraph terms which originated on the landlines, CQ was brought over into radio and used as a general call to all ships by the Marconi Company.
Other companies used KA until the London Convention of 1912, which adopted CQ as the international general call or "attention" signal. CQ still means, literally, "attention" but in amateur radio its meaning is perhaps more accurately described by Thomas Raddell who compared it to yelling "Hey, Mac!" down a drain pipe.

But why the letters CQ? From the French, sécurité, (safety or, as intended here, "pay attention"). Later, the origin of the abbreviation was changed to the phrase "seek you."

73

The traditional expression "73" goes right back to the beginning of the landline telegraph days. It is found in some of the earliest editions of the numerical codes, each with a different definition, but each with the same idea in mind--it indicated that the end, or signature, was coming up. But there are no data to prove that any of these were used.

The first authentic use of 73 is in the publication The National Telegraph Review and Operators' Guide, first published in April 1857. At that time, 73 meant "My love to you!" Succeeding issues of this publication continued to use this definition of the term. Curiously enough, some of the other numerals then used have the same definition now that they had then, but within a short time, the use of 73 began to change.

In the National Telegraph Convention, the numeral was changed from the Valentine-type sentiment to a vague sign of fraternalism. Here, 73 was a greeting, a friendly "word" between operators and it was so used on all wires.

In 1859, the Western Union Company set up the standard "92 Code". A list of numerals from one to 92 was compiled to indicate a series of prepared phrases for use by the operators on the wires. Here, in the 92 Code, 73 changes from a fraternal sign to a very flowery "accept my compliments," which was in keeping with the florid language of that era.

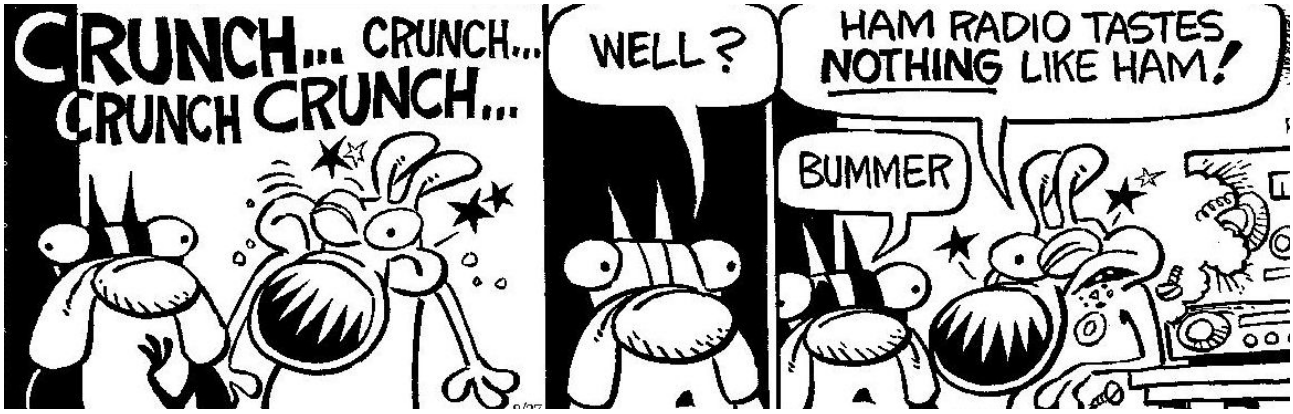
Over the years from 1859 to 1900, the many manuals of telegraphy show variations of this meaning. Dodge's The Telegraph Instructor shows it merely as "compliments." The Twentieth Century Manual of Railway and Commercial Telegraphy defines it two ways, one listing as "my compliments to you;" but in the glossary of abbreviations it is merely "compliments." Theodore A. Edison's Telegraphy Self-Taught shows a return to "accept my compliments." By 1908, however, a later edition of the Dodge Manual gives us today's definition of "best regards" with a backward look at the older meaning in another part of the work where it also lists it as "compliments."

"Best regards" has remained ever since as the "put-it-down-in-black-and-white" meaning of 73 but it has acquired overtones of much warmer meaning. Today, amateurs use it more in the manner that James Reid had intended that it be used --a "friendly word between operators."

The International Code

Although Samuel F. B. Morse's code achieved nearly universal use on the landline telegraph systems of America, the Europeans never did like it. They felt that the "space" characters were likely to cause errors in receiving. (The letter "O," for example, was sent "ditdit" and the "I" was sent as in the now familiar International Code: "didit.") The Europeans developed a number of binary dot-dash codes to suit their own needs. The code in use on the wires of the Prussian Empire in 1852 bore a strong resemblance to the present International Code, but it used the American Morse numerals. Seven years later the "European Code" was formulated, using the Austro-Prussian alphabet and adapting the numerals we now use. This was adopted for use by all European countries and the name was changed in 1912 to "International Code," although it is also known, even today, as the "Continental Code."

The numerals themselves are interesting. No known code of the European continent shows anything which resembles them. They just showed up in the European Code. However, the Bain Code, used on many lines in the U.S. circa 1846, had numerals which closely match those of the International Code. From one through five, Bain and International are identical. Reversing the Bain Code numerals six through zero produces the International numerals. There is nothing to prove that the Bain Code was the basis for the International numerals, but the conclusion is almost inescapable that someone at the Vienna conference at which International was adopted, was familiar with Bain's numerals. Bain's code was a modification of the Davy code of 1839, so it is possible that the numerals we now use are older than any of the alphabets.



New and Improved, homemade from trash, CW key!

With the kind permission of Broadcast Australia and many thanks to Rex VK3OF a Special Event Amateur Radio HF station set up at Radio Australia.

This special event will be held on Saturday 14th – Sunday 15th, of March 2020.
The event will be commemorated with a special QSL card.

Amateur radio operators will are invited to register to be on-site to participate in this special event.
Site restrictions limit us to no more than six on site at any one time, so there will be a roster.
Reservations for specific time slots are required.

This is not a tour of Radio Australia,
This access is being provided just for operators of the special event station.
This Special Event TX Will Use Former Radio Australia Antennas

Over March 14 & 15, Shepparton and District Amateur Radio Club will be on the air as VI3RA (RA for Radio Australia), connecting their transceivers to the curtain array and rhombic antennas at the former Radio Australia site in VK3. It's some 3 years since Radio Australia ceased transmitting from the site.

VI3RA will operate on 40, 30, 20, 17, and 15 meters.

Local amateurs will be given the unique opportunity to explore the use of high-gain antennas whilst giving amateurs throughout the world a unique opportunity to contact a station using such high-gain antennas.
It's been calculated a gain of 15 dB on the lower frequencies and at least 20 dB on 21 MHz will be achievable.

WIA John Moyle Field Day 2020
Weekend of 21-22 March

From UTC 0100 on the Saturday 21st to 0059 Sunday 22nd

Frequencies are not set in stone but a good start,

6M 50.150 USB or 52.525 FM,
2M 144.150 USB or 146.500 FM,
70cm 432.150 USB or 439.000 FM,
23cm 1296.150 USB or FM,
13cm 2403.150 USB,
9cm 3398.150 USB,
3cm 10,368.150 USB

Contest History

The contest is run each year in memory of the late John Moyle who was a long term editor of the Wireless Weekly, (later Radio & Hobbies - later Radio Television & Hobbies) from 1947 until his untimely death in 1960.

He served in the RAAF with distinction and was responsible for a number of innovative solutions to keeping radio and radar equipment working under difficult wartime and working conditions.

The WIA decided that a suitable long term memorial to John Moyle would be a Field Day with a focus on portable or field operation. The contest has been conducted annually ever since.

The rules of the contest have gradually changed over time and are still revised regularly.
The contest is still for portable or field operators, though Home stations can of course take part using a different scoring system.

Though Multiple Operators and club stations are actively encouraged to take part in the contest they are not competing against the single operator stations and in effect there are two separate contests run at the same time. Hence single operator stations take part in their own contest against other single operators.

Are you interested in Vintage Radio?

Why not join the Australian Vintage Radio Society?

The AVRS is a not-for-profit organisation dedicated to the preservation of our Radio and, Radio-related, Electronic History.

Members come from all walks of life and enjoy the company of persons with similar interests.

Meetings are held on the first Saturday, (afternoon), of the month and visitors and prospective members are most welcome. Most meetings include a talk by a presenter with experience in the field of restoration or history and a display of radios and related equipment of the era.

Advantages of AVRS membership include:

- Regular meetings.
- Access to the Valve and Component Bank, where Members can obtain valves and hard to get parts at reasonable prices.
- Circuit Diagram Service, to assist members with their electrical restorations.
- Technical assistance.
- Members only, Auctions and Swap Meets.
- Restoration workshops.
- Bi-monthly Newsletter.
- Social interaction with other members.

Costs:

Joining fee: $5, Annual membership: $35.

Membership Application Forms can be obtained from the Secretary at:

Australian Vintage Radio Society Inc, P.O. Box 3099, Syndal L.P.O., Victoria, 3150, Australia.

Telephone 03 9517 9385, or download from www.avrs.org.au

Meeting venue:

St Faiths Anglican Church Hall Burwood,
4-8 Charles St. Glen Iris 3146. Melway 60 G6.

Starting time: 1.30pm.

NEVARC Nets

40M Net

Monday, Wednesday and Fridays
10am Local time (East coast)
7.095 MHz LSB
Approximately + or – QRM
7.097 MHz has been used for a while now
Hosted by Ron VK3AHR

80M Net

Wednesday 20:30 Local time
3.622 MHz LSB
Hosted by Ron VK3AHR
Using the club call VK3ANE

2M Nets

Monday at 2000 local time on
VK3RWO repeater
146.975 MHz

President, VK2VU, Gary
Vice President, Tom VK3NXT
Secretary, VK2FKLR, Kathleen
Treasurer, Amy

WIA Affiliated Club

NEVARC
North East Victoria Amateur Radio Club

NEVARC CLUB PROFILE

History

The North East Victoria Amateur Radio Club (NEVARC) formed in 2014.
As of the 7th August 2014, Incorporated, Registered Incorporation number A0061589C.
NEVARC is an affiliated club of the Wireless Institute of Australia.

Meetings

Meetings details are on the club website, the Second Sunday of every month, check for latest scheduled details.
Meetings held at the Belviour Guides Hall, 6 Silva Drive West Wodonga.
Meetings commence with a BBQ (with a donation tin for meat) at 12pm with meeting afterwards.
Members are encouraged to turn up a little earlier for clubroom maintenance.
Call in Via VK3RWO, 146.975, 123 Hz tone.

VK3ANE NETS

HF
7.095 MHz Monday,Wednesday,Friday - 10am Local time currently using 7097 MHz
3.622 MHz Wednesday - 8.30pm Local time

VHF
VK3RWO Repeater 146.975 MHz–Monday - 8pm Local time
All nets are hosted by Ron Hanel VK3AHR using the club callsign VK3ANE

Benefits

To provide the opportunity for Amateur Radio Operators and Short Wave Listeners to enhance their hobby through interaction with other Amateur Radio Operators and Short Wave Listeners. Free technology and related presentations, sponsored construction activities, discounted (and sometimes free) equipment, network of likeminded radio and electronics enthusiasts. Excellent club facilities and environment, ample car parking.

Website: www.nevarc.org.au
Facebook: www.facebook.com/nevicARC/

Postal: **NEVARC Secretary**
PO Box 69
Wahgunyah Vic 3683

All editors' comments and other opinions in submitted articles may not always represent the opinions of the committee or the members of NEVARC, but published in spirit, to promote interest and active discussion on club activities and the promotion of Amateur Radio.
Contributions to NEVARC News are always welcome from members.
Email attachments of Word™, Plain Text, Excel™, PDF™ and JPG are all acceptable.
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Please include a stamped self-addressed envelope if you require your submission notes returned.
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While we strive to be accurate, no responsibility taken for errors, omissions, or other perceived deficiencies, in respect of information contained in technical or other articles.
Any dates, times and locations given for upcoming events please check with a reliable source closer to the event.
This is particularly true for pre-planned outdoor activities affected by adverse weather etc.
The club website http://nevarc.org.au/has current information on planned events and scheduled meeting dates.
You can get the WIA News sent to your inbox each week by simply clicking a link and entering your email address found at www.wia.org.au The links for either text email or MP3 voice files are there as well as Podcasts and Twitter. This WIA service is FREE.